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Memorandum

To: Ms. Marcia Rasmussen
Director, Department of Planning and
Land Management
Town of Concord
141 Keyes Road
Concord, Massachusetts 01742

Date: March 12, 2008

Project No.: 10441.00

From: Joseph G. Quitter, P.E.
Project Manager, Transportation Systems

Re: Review of Traffic Impact and Access Study
Proposed Residential Development
Concord, Massachusetts

Vanasse Hangen Brustlin, Inc. (VHB) has performed a professional and independent technical review of the amended traffic impact and access study (TIAS) prepared by *Vanasse & Associates, Inc. (VAI)* for a proposed 350-unit residential apartment community, to be located at 48 Old Powder Mill Road in Concord, Massachusetts. The site currently contains two commercial buildings that will be demolished as part of this project. The site would utilize the existing driveways off of Old Powder Mill Road, a public way within the Town of Acton that becomes Sudbury Road across the Acton Town Line on its way to/from Route 62. This review included an analysis of the information presented in the document that was submitted on behalf of the Applicant.

Submission Materials

As part of the technical analysis for the Town of Concord, VHB reviewed the following report submitted by the Applicant:

- *Traffic Impact and Access Study, Proposed Residential Development, Concord, Massachusetts;*
Prepared by Vanasse & Associates, Inc.; February 20, 2008.

This information has been considered in the preparation of this memorandum. Other various sources of information were also referenced, as needed, and are footnoted in the memorandum.

Overview

The traffic report and accompanying plans have been prepared in a manner consistent with transportation engineering standards. There are a few areas, however, where VHB believes some additional information and/or clarification is required. The following includes the Applicant's proposed mitigation measures and an itemized list of the recommendations to which the Applicant should respond.

The Applicant has made a commitment to implement various roadway and streetscape improvements at study area locations, including resurfacing and reconstructing roadways, realigning Old Powder Mill Road, preparing engineering design plans, providing partial construction funding, designing and implementing traffic signal timing and phasing changes, and designing and implementing a sign and pavement marking improvement program. In addition to these mitigation measures, VHB recommends that the following issues be addressed:

1. There was no mention of the posted or prima facie speed limit on Sudbury Road. To determine whether the measured 85th percentile speed is a suitable variable for evaluating sight distance, the Applicant should provide the posted or prima facie speed limit on Sudbury Road.
2. Three study intersections experience crash rates that exceed the MassHighway District 3 average rate by a substantial amount. The Applicant has requested supplemental information from the Maynard and Sudbury Police Departments in order to verify these findings. It is recommended that the Applicant provide this information when it becomes available and, should the local data support the results shown by the MassHighway data, that the Applicant propose measures to mitigate the safety issues at these locations.
3. If the posted or prima facie speed limit is greater than the 85th percentile measured speed, it is recommended that the Applicant re-evaluate the sight distance safety using this new value.
4. Intersection sight distance triangles should be shown on the site plan and any objects (vegetation or signage, for example) should be modified or removed so that safe sight lines can be provided.

The following is a general review of the submission materials, which include additional detail related to the comments above.

Traffic Impact and Access Study Review

In general, the study has been prepared to industry standards using information and methods suitable for a traffic impact and access study.

Introduction

The object of the study was stated, the project was described in detail, and the study methodology was outlined. The study area appears reasonable for a project of this size, considering the roadway network in the area. The description of the proposed project and existing site were presented in a clear manner and match what is shown on the site location map. The proposed access plan appears reasonable.

Existing Conditions

The description of the existing roadways and intersections was presented in a clear manner and appears to be accurate.

The study notes traffic volumes were collected mechanically along Sudbury Road in the vicinity of the site and manually at the study intersections in September and December 2006, July 2007, and January 2008. As traffic counted in January, July and December represents below-average seasonal conditions according to MassHighway data, these volumes were adjusted upward to reflect average-month conditions. The September volumes represent above-average seasonal conditions and were not adjusted. These volumes appear to be acceptable for use in this traffic study.

The study notes that the second phase of the Main Street Footprints Project is under design, while the Assabet River Rail Trail is under construction. Also, there are only two MBTA Commuter Rail stations within a 2.5-mile radius of the project site.

Vehicle speed measurements were recorded along Sudbury Road in the vicinity of the site. The 85th percentile speed was determined to be 28 mph, which was used later in the study for the sight distance evaluation. There was no mention of the posted speed limit on Sudbury Road. It should be noted that if the posted speed limit is greater than the 85th percentile measured speed, the posted speed may be a more suitable variable in evaluating sight distance, since that speed is allowed by

law and sets driver expectation. It is recommended that the Applicant provide the posted speed limit on Sudbury Road. If there is no posted speed limit, the prima facie speed limit as defined in the Massachusetts Speed Law¹ should be identified.

Crash data for the most recent three-year period (2004 – 2006) was obtained from MassHighway. These crashes and the counted traffic volumes were used to calculate crash rates according to the methodology defined by MassHighway. It should be noted that the calculated crash rates for the intersections located in Concord were compared to District 4 average rates, while the crash rates for the other intersections were compared to District 3 average rates. This is standard practice and the analysis results appear to be reasonable. The results show that three study intersections in Maynard and Sudbury experience crash rates that exceed the MassHighway District 3 average rates. One of which, the intersection of Route 27 at Route 62 and Waltham Street in Maynard, was found to have a crash rate that is more than twice the District 3 average rate. The Applicant has requested supplemental information from the Maynard and Sudbury Police Departments in order to verify these findings. It is recommended that the Applicant provide this information when it becomes available and, should the local data support the results shown by the MassHighway data, that the Applicant propose measures to mitigate the safety issues at these locations.

Future Conditions

It is noted that several development projects were identified by MassHighway and Towns of Acton, Concord, Maynard, and Sudbury that would add traffic to the study area roadway network. In addition, a background growth rate of one percent was used to account for unforeseen future developments that may have a traffic impact on study intersections. This growth rate appears to be reasonable for use in this traffic study. The 2012 No-Build traffic volume networks appear to have developed according to industry standards.

MassHighway and the same towns identified several planned roadway improvement projects that are expected to be completed within the study area. The two projects involve adding traffic capacity to Route 62, which may be of benefit to future traffic operations at study area intersections.

Trip generation for the proposed site was estimated using data established by the *Institute of Transportation Engineers* (ITE)². This is an accepted practice in the traffic engineering industry. Site-generated trips were distributed using to journey-to-work data from the 2000 U.S. Census and adjusted based on existing study area travel patterns and the location of Concord public schools. A review of this methodology and its implementation showed the trip distribution used in this study appears reasonable and, in fact, the adjustments made likely result in the assignment of trips demonstrating a more accurate representation than would be the case without the adjustments.

The 2012 Build traffic volume networks appear to have developed according to industry standards. A comparison between No-Build and Build conditions traffic shows that the project would result in peak hour traffic volume increases of up to 5.3 percent on study roadways. On Route 62, the increase in peak hour traffic volumes would be between 3.8 and 4.4 percent. The magnitude of these traffic volume increases are expected for a project of this size and type.

Traffic Operations Analysis

Traffic operation analysis for the study intersections was determined using procedures described in the *Highway Capacity Manual* (HCM 2000)³. This is standard practice and the analysis results appear to be reasonable.

¹ *Procedures for Speed Zoning on State and Municipal Roadways*; MassHighway; Boston, MA; 2005.

² *Trip Generation*; Seventh Edition; Institute of Transportation Engineers (ITE); Washington, DC; 2003.

³ *Highway Capacity Manual* (HCM 2000); Transportation Research Board; Washington, DC; 2000.

The results of this analysis indicate that all movements at the site driveway are expected to operate at LOS B or better during both peak hours under Build conditions. An inspection of the unsignalized intersection analysis results showed that at all of the critical movements and/or approaches except one the level of service is maintained between the projected No-Build and Build conditions. The exception is the Sudbury Road approach to Route 62 during the morning peak hour, when it degrades from LOS E to LOS F and the vehicle queue increases from five to 20 vehicles.

The signalized intersection analysis results show that only three movements and/or approaches experience degradation to LOS E or LOS F from a better level of service between the projected No-Build and Build conditions. The increase in vehicle queue length for each of these three movements is negligible. These locations are:

- Route 62 northeastbound left turn at High Street degrades from LOS E to LOS F during the evening peak hour;
- Route 27 southbound through at Route 117 degrades from LOS E to LOS F during morning peak hour; and
- Route 27 northbound left turn at Route 117 degrades from LOS D to LOS E during evening peak hour.

Traffic Signal Warrants Analysis

A traffic signal warrants analysis was conducted for the intersection of Route 62 at Sudbury Road using data provided in the Manual on Uniform Traffic Control Devices (MUTCD)⁴. The review indicates that this location warrants traffic signal control during the Existing condition, as well as during the No-Build and Build conditions.

Sight Distance Evaluation

A sight distance safety evaluation was conducted at the intersection of Sudbury Road at Old Powder Mill Road based on the measured 85th percentile speed of 28 miles per hour and American Association of State Highway and Transportation Officials (AASHTO) standards⁵. This is standard practice. However, as discussed in the Existing Conditions section, if the posted or prima facie speed limit is greater than the 85th percentile measured speed, the posted or prima facie speed may be a more suitable variable in evaluating sight distance. To reiterate, it is recommended that the Applicant provide the posted or prima facie speed limit on Sudbury Road. If this speed is greater than the 85th percentile measured speed, it is recommended that the Applicant re-evaluate the sight distance safety using this new value.

The results indicate that, without the addition of proposed vegetation or signing that would block available sight lines, the proposed site driveways would exceed the minimum stopping sight distance (SSD) and the desired intersection sight distance (ISD) requirements. It is recommended that ISD sight triangles be shown on the site plan to define the areas in which an exiting driver's line of sight should not be obstructed.

Conclusions and Recommendations

The conclusion to the study summarizes the findings of the traffic impact assessment and details the proposed transportation-related mitigation. The proposed mitigation includes various roadway and streetscape improvements at study area locations, such as resurfacing and reconstructing roadways, realigning Old Powder Mill Road, preparing engineering design plans, providing partial construction funding, designing and implementing traffic signal timing and phasing changes, and

⁴ Manual on Uniform Traffic Control Devices (MUTCD); United States Department of Transportation/Federal Highway Administration (USDOT/FHWA); Washington, DC; 2003.

⁵ A Policy on Geometric Design of Highways and Streets; American Association of State Highway and Transportation Officials (AASHTO); Washington, DC; 2004.

designing and implementing a sign and pavement marking improvement program. These transportation improvements are expected to result in reductions in delay times for various movements at several locations in the study area. This mitigation package is comprehensive and seems reasonable for a project of this size.

Conclusion

The preceding information was prepared for use by the Town of Concord to assist them in the review of the proposed residential apartment community, to be located at 48 Old Powder Mill Road in Concord, Massachusetts. The technical review of the TIAS for this project is final, pending further comments by the Community Safety Officer.

cc: Robert L. Nagi, P.E., PTOE - VHB
Donald J. Cooke, P.E., PTOE - VHB